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Governor Theodore Kulongoski
State Capitol
Salem, Oregon 97301-4047

Dear Governor Kulongoski

We thank you for the invitation to comment on the West Coast Governors' Agreement on Ocean Health.

Key Points

- The College of Oceanic and Atmospheric Sciences at Oregon State University endorses the West Coast Governors' Agreement on Ocean Health.

- The College strongly supports the development of a regional research plan for the west coast. We encourage all three states, after appropriate consideration, to ratify the plan and direct state financial support and request federal support to give effect to the research plan's priorities.

- Fundamental and applied research and graduate teaching activities in the College supports the following areas of the Governors' Agreement:
  1. Ensuring clean coastal waters and beaches;
  2. Protecting and restoring healthy ocean and coastal habitats;
  3. Promoting the effective implementation of ecosystem-based management of our ocean and coastal resources;
  4. Increasing ocean awareness and literacy among our citizens;
  5. Expanding ocean and coastal scientific information, research, and monitoring.

- Expanding ocean and coastal scientific information, research, and monitoring requires:
  - Investing in the new technology and integrated systems such as the establishment and ongoing integrated ocean observing systems.
  - Retaining ocean going research vessels in each state. State support is required for the replacement of existing vessels when they reach the end of their operational life.
  - State and federal research investment in fundamental ocean and coastal science that is exploratory in nature and agenda free.
  - Collaboration between west coast research institutes and initiatives to coordinate and grow investment in coastal and ocean research.
  - Recognition that our ocean and atmospheric systems are coupled. Focusing on the study of the ocean and neglecting atmospheric research will weaken our understanding of important processes such as climate variability and change.

Who we are

The College of Oceanic and Atmospheric Sciences (COAS) is a leader in the study of the Earth as an integrated system, providing scientific understanding to address complex environmental challenges. Our research productivity, the national and international reputations of our faculty, and our success in obtaining external funding allow us to make significant contributions to oceanic and atmospheric sciences knowledge.

COAS is a graduate research college. Within the College there are six discipline groups:

- Atmospheric Sciences
- Biological Oceanography
- Chemical Oceanography
- Physical Oceanography
- Marine Geology and Geophysics
- Marine Resource Management

COAS researchers work with each other and other researchers across the country and around the world to share knowledge and discovery. Because COAS combines the studies of solid earth, ocean and atmosphere, no barriers stand in the way of shared research tied to the integration of the whole Earth system. We develop and use state-of-the-art sensors and laboratory instruments to study all facets of Earth science. Many of the systems are available to collaborators around the world via the Internet. Our Earth system research provides practical knowledge to address societal needs. Local and national environmental managers and policy makers can make informed decisions based on this vital COAS research.

COAS Support for West Coast Governors' Agreement on Ocean Health and Development of a Long-term Research Plan

The California Current Large Marine Ecosystem links our states. Sustaining its economic, environmental and social benefits to our present and future citizens necessitates coordinated and collaborative actions to address common ocean and coastal management opportunities and challenges.

COAS therefore endorses the West Coast Governors' Agreement on Ocean Health. It represents an integrated approach to ocean and coastal governance that is underpinned by recognition for the need for expanded coastal and ocean, scientific information, research and monitoring. The College particularly supports the development of a long-term research plan. Once established it is critical that financial support from state and federal agencies for the plan is forthcoming and sustained. Personnel, facilities and equipment and the initiatives they support are not a short-term or insignificant investment for research institutions. Prioritized research needs clearly linked to ocean health outcomes will help create a more stable environment for investment in research.

It is also important to recognize that our ocean and atmospheric systems are coupled. Focusing on the study of the ocean and neglecting atmospheric research will weaken our

understanding of important processes such as climate variability and change. Provision for cross-cutting interdisciplinary research should be explicitly provided for in the regional research plan.

Though the development of a long-term research program will be challenging (page 10 of the WCGA Discussion Paper), it is no more challenging than other aspects of the Governors' Agreement. Much data already exists on our oceans and coasts and the building blocks for ecosystem-based management are in place. Uncertainty is inherent in a dynamic, multifaceted environment that is profoundly influenced by the interplay of oceanic, terrestrial and atmospheric systems. The key challenge is not the development of the research plan but in the use of the information generated by the plan.

Under the rubric of ecosystem based management coastal and ocean management agencies and stakeholders will increasingly seek to use the vast amount of data generated by current and future research. Many barriers exist to the effective use of scientific information – the way it is disseminated and archived, the skill levels of agency staff interpreting data, access to real time scientific information, agency and legal mandates among others. To maximize the value of research to ocean and coastal managers these barriers must also be addressed. COAS and its partners are working to better understand the needs of potential users of its information. We are also exploring innovative ways of meeting these needs such as making data available in near real time over the Internet.

COAS Contribution to the Priority Areas Identified in the Governors' Agreement

The expertise and enthusiasm of COAS faculty is reflected in many research initiatives supporting five of the priority areas identified in the Governors' Agreement:

- Ensuring clean coastal waters and beaches;
- Protecting and restoring healthy ocean and coastal habitats;
- Promoting the effective implementation of ecosystem-based management of our ocean and coastal resources;
- Increasing ocean awareness and literacy among our citizens;
- Expanding ocean and coastal scientific information, research, and monitoring.

Key COAS research initiatives are listed in Appendix 1.

The Future of Fundamental Science in Ocean and Coastal Scientific Information, Research, and Monitoring

Population growth, environmental and climate change and existing and new demands on coastal and ocean ecosystem services such as ocean energy and offshore aquaculture and their sustainable management pose fundamental questions about the composition, structure and functioning of our coastal ecosystem. COAS, as shown in Appendix I, is already engaged in underpinning research to better understand the dynamic nature of the ocean. Key future needs for research and monitoring include: Integrated Ocean Observing Systems; maintaining Oregon's seagoing research capabilities; and maintaining state and federal funding of collaborative ocean research.

Integrated Ocean Observing

This research is about to be aided by revolution in technology. A new generation of rugged and cost effective sensors to obtain information about the biological, chemical, and physical components of our oceans are being developed. New autonomous sensors on fixed platforms will be complemented by mobile sensor platforms (e.g., autonomous undersea vehicles) to monitor and observe the land, the atmosphere, and the ocean surface, depths, and floor. With computer processing speed doubling every 18 months, there will be better frameworks for constructing complex coupled ocean and atmospheric models as well as better data management and analysis tools. Telecommunications will continue to improve in resolution, bandwidth content and availability. Global networks will have the capacity to link modeling and ecological information centers seamlessly and effortlessly with service providers and users.

COAS is exploiting this technological revolution in its participation in and development of Integrated Ocean Observing Systems. The Oregon Coastal Ocean Observing System (OrCOOS) represents the integration of a wide variety of ocean observing and modeling systems that will provide knowledge services for scientific, management, and educational purposes. OrCOOS will consist of instrumentation deployed in and near the coastal ocean and returning data shoreside in real-time along with data from satellites and shore-based sensors. Data from moorings, undersea autonomous vehicles, land-based surface current mapping systems and wave detection radars, coupled together with computer models of the coastal ocean circulation and waves, will be made available via a public web portal. OrCOOS will be a key element or research efforts underpinning the Governors' Agreement on Ocean Health.

Maintaining Oregon's Contribution to West Coast Ocean Research

Central to the ability of Oregon to be a full partner in ocean and coastal research on the west coast is retaining its scientific research vessel capability. Since the early years of oceanography at OSU, we have operated research vessels as part of the national oceanographic fleet (known as University National Oceanographic Laboratory System, UNOLS). The research vessel:

- Is a symbol of Oregon's status as an ocean state and as a responsible steward of our coastal ocean;
- supports not only research performed in the College of Oceanic and Atmospheric Sciences, but also in several other colleges on campus, by the Oregon Sea Grant Program, two cooperative institutes with NOAA (CIMRS and CIOSS), and the Hatfield Marine Science Center (HMSC);
- provides central access to the US west coast for all oceanographic researchers bringing many national and international scientists to Oregon to appreciate our state and ocean environment;
- supports a well-regarded docking and maintenance facility in Newport; and
- is supported by annual expenditures of approximately $3,550,000, most of which is spent in the state of Oregon.

Today we face a significant threat in the loss and non-replacement of our current (since 1975) but aging research vessel, *RV Wecoma*. Without state action now to improve our competitive position in federal decisions deciding ship replacement and homeports, OSU will likely cease being a vessel-operating institution within a few years. This significant loss of capability, prestige, and revenue would be a blow to the city of Newport, to OSU and to the State of Oregon, and would have long-term consequences for the future of marine science and research in the state.

To be named as the home of a new research vessel in upcoming federal competitions, Oregon and OSU will need to show that upcoming research incentives will create a high demand for such a vessel in the NE Pacific region and that OSU facilities are modern and have a record of safe and cost efficient operations. The College is confident of our competitive positions on these two points and is prepared to develop and document supporting arguments in a federal competition for a replacement vessel. However, it is highly improbable that a bid to operate a new research vessel will succeed without a tangible demonstration of state financial commitment, even *with* our long and successful track record.

State and Federal Funding Collaborative and Interdisciplinary Research
Fundamental ocean and coastal science is exploratory in nature and agenda free. This means that it is an end in itself as well as a contribution to ocean and coastal management outcomes. An increasing trend toward private funding of ocean research while welcome in a time of shrinking federal and state budgets must be balanced with ongoing federal and state support for research. Stakeholder organizations and foundations do not necessarily represent the wider interests of west coast citizens. To maintain the integrity of research initiatives and products, to avoid conflicts of interest and to retain the confidence of decision makers and the public it is important that state and federal agency continue to play an active and significant role in funding ocean and coastal research.

Collaboration between state and federally agencies, west coast research institutions and foundations to coordinate and grow investment in coastal and ocean research is one way in which we can work together with a common oceans agenda. The involvement of COAS faculty with the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) is one successful example of interdisciplinary collaboration. The proposed long-term research plan will be key to promoting and enhancing coordination. Competition and duplication of research effort must be minimized at a time when resources are stretched by declining budgets and increasing demand for scientific information, research and monitoring.

Once again COAS thanks you for this opportunity to comment on the West Coast Governors' Agreement on Ocean Health. We wish the states every success in this endeavor and believe progress towards achieving its objectives will secure our ocean's wealth for our citizens and future generations. Our faculty and College will continue to participate in individual components of the Agreement. Please do not hesitate to contact the College for clarification or expansion of anything in this submission.

Yours sincerely,

Mark Abbott
Dean

Michael Harte
Director, Marine Resource Management Program
Sea Grant Extension Specialist

Appendix I COAS Research Initiatives in Governors' Agreement Priority Areas

Governors' Agreement Priority Area	Key Research Initiatives	Key Faculty
Ensuring clean coastal waters and beaches	Study of the oceanographic processes that generate Hazardous Algae Blooms off Oregon, and to develop satellite-based techniques to better predict and track HABs.	Pete Strutton
	Research into nearshore circulation and mixing, relevant to nearshore water quality, beach cleanliness and marine debris.	Rob Holman
Protecting and restoring healthy ocean and coastal habitats	Research on littoral processes to better understand beach erosion and restoration	Rob Holman Tuba Ozkan-Haller
	Active Tectonics and Mapping Laboratory: Mapping of seafloor bathymetry, geology and habitats to create habitat maps used for identifying essential fish habitat.	Chris Goldfinger
	Researching the ice ages as a natural laboratory for understanding climate change. Recent projects include factors causing changes in global ocean circulation and the global carbon cycle, documenting the role oceans play in long-term climate changes, the role that unstable tropical climates play in triggering global climate effects, and analyzing patterns of large-scale climate change.	Alan Mix
	Understanding of various feedbacks within the earth's climate system. These feedbacks shape how temperatures, precipitation, and winds respond to changes in the energy budget of the planet.	Karen Shell
	Simulation of the coastal circulations; resonant interaction between surface winds and upper ocean turbulence.	Eric Skyllingstad
	Changes in frequency and intensity of coastal storms and coastal erosion associated with climate variability and change.	Paul Komar
Governors' Agreement Priority Area	**Key Research Initiatives**	**Key Faculty**
	The coastal ocean modeling group at COAS utilizes comprehensive computer models to understand dominant processes, such as alongshore and cross-shore material transports, mixing, physical-biological interactions, and hypoxia, on the continental shelf off US West Coast (esp.	Alexandre Kurapov

	Oregon). Such advancement of the ocean modeling, and combining the models and observations via data assimilation will allow real-time prediction and forecasting of the coastal currents and other quantities, providing a tool for environmental monitoring.	
Promoting the effective implementation of ecosystem-based management of our ocean and coastal resources	Evaluating ocean retention regions (residence times) in space and time. Growth and development rates of Pacific krill using bioenergetic models coupled with physical transport models. Spatial-temporal patterns of potential growth of juvenile coho salmon using bioenergetics models coupled with physical circulation models.	Hal Batchelder
	CROOS Project: Small-scale ocean distribution of pre-spawning Chinook off the West Coast of USA in relation to their genetic origin and oceanographic condition TUNA project: Changes in albacore tuna distribution along the North America West Coast in relation to oceanographic and climate conditions.	Lorenzo Ciannelli (in partnership with NOAA fisheries and Coastal Oregon Marine Experiment Station)
	Studying rates of benthic community oxygen consumption on continental shelves to better understand causes of hypoxia and changes in the coastal carbon cycle.	Claire Reimers
	Ecosystem modeling of lower trophic levels coupled to higher trophic levels. Coupled circulation/ecosystem modeling of temporal and spatial response of ecosystems to upwelling off the Oregon Coast and influence of the Columbia River Plume and jet stream oscillations on coast ecosystems.	Yvette Spitz
	Decision support systems to assist Marine Protected Area planning.	Michael Harte
Increasing ocean awareness and literacy among our citizens	Argus Program, providing on-line access to changing beach dynamics (on the Oregon Coast and multiple other locations around the world) and our research.	Rob Holman

Governors' Agreement Priority Area	Key Research Initiatives	Key Faculty
	Understanding how people learn in different situations, how scientific information can be communicated and how ocean and coastal resource issues can be resolved through effective communication and dispute resolution strategies.	Michael Harte (in association with Oregon Sea Grant)
Expanding ocean and coastal scientific information, research, and monitoring.	Developing radar-based remote sensing techniques for monitoring the nearshore, to be used in conjunction with Argus program.	Rob Holman (in association with Ocean Engineering)
	Cooperative Institute for Oceanographic Satellite Studies: Coperative (federal-academic) center of excellence for research and education, which involves satellite remote sensing of the ocean and its air-sea interface, along with models of the ocean and overlying atmosphere.	Ted Strub
	Developing ocean microbial fuel cells as long-term power sources for ocean sensors used in monitoring.	Claire Reimers
	Integrated Ocean Observing Systems - The Oregon Coastal Ocean Observing System (OrCOOS) brings together observations along the Oregon Coast to help address issues related to climate change, ecosystem preservation and management, coastal water quality, maritime operations, coastal hazards and national security.	Jack Barth, Kipp Sherman, Mike Kosro, Murray Levine